

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference MH/LB 54797	FOR FURTHER ACTION <small>see Form PCT/ISA/220 as well as, where applicable, item 5 below.</small>	
International application No. PCT/SE 2005/001336	International filing date (day/month/year) 14 Sept 2005	(Earliest) Priority Date (day/month/year) 14 Sept 2004
Applicant AGVALD, Per et al.		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 9 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the language, the international search was carried out on the basis of:

- ☐ the international application in the language in which it was filed
☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

b. ☐ With regard to any nucleotide and/or amino acid sequence disclosed in the international application, see Box No. I.

2. ☒ Certain claims were found unsearchable (see Box No. II)

3. ☒ Unity of invention is lacking (see Box No. III)

4. With regard to the title,

- ☐ the text is approved as submitted by the applicant.
☒ the text has been established by this Authority to read as follows:

Compositions comprising compounds capable of forming a reversible bond or association with gaseous nitric oxide.

5. With regard to the abstract,

- ☐ the text is approved as submitted by the applicant.
☒ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the drawings,

a. the figure of the drawings to be published with the abstract is Figure No. 16

- ☒ as suggested by the applicant.
☐ as selected by this Authority, because the applicant failed to suggest a figure.
☐ as selected by this Authority, because this figure better characterizes the invention.

b. ☐ none of the figures is to be published with the abstract.

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Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☒ Claims Nos.: 29-34, 39-40
because they relate to subject matter not required to be searched by this Authority, namely:
Claims 29-34, 39-40 relate to a method of treatment of the human or animal body by surgery or by therapy, as well as diagnostic methods /Rule 39.1(iv). Nevertheless, a search has been executed for these claims. The search has been based on the alleged effects of the compositions.
2. ☒ Claims Nos.: Claims 1-3, 8, 13-14, 16, 18, 20, 22, 26, 35-36 partly claims 10-11, 27-28, 37-38
because they relate to parts of the international application that do not comply with the prescribed requirements to such an
See extra sheet
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

The following separate inventions were identified:

1: Claims 4-12 and partly claims 1-3, 15, 26-40 directed to compositions comprising sugars.

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims. /
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☒ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

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Continuation Box II.2

Present claims 1, 26 and partly claims 27-28 relate to a composition and claims 35-36 and partly 38 to a method defined by reference to a desirable characteristic or property, namely that it comprises a compound capable of forming a reversible bond or association with NO. The claims cover all compositions having this characteristic or property, whereas the application provides support within the meaning of Article 6 PCT and / or disclosure within the meaning of Article 5 PCT for only a very limited number of such compositions. In the present case, the claims so lack support, and the application so lacks disclosure, that a meaningful search over the whole of the claimed scope is impossible. Independent of the above reasoning, the claims also lacks clarity (Article 6 PCT). An attempt is made to define the composition by reference to a result to be achieved. Again, this lack of clarity in the present case is such as to render a meaningful search over the whole of the claimed scope impossible.

Consequently, the search has been carried out for those parts of the claims which appear to be clear, supported and disclosed, namely those parts relating to compositions comprising the compounds, or compounds from well defined groups, mentioned in claims 4-25. A search has also been carried out for general terms, such as alcohols, sugars and proteins, and all compounds in table 1 in the description.

In present claims 2-3 and partly claims 27-28 and 37-38 the compound capable of forming a reversible bond or association with NO is specified to a carbohydrate or a compound comprising at least one hydroxyl group. However, the specifications are vague and unclear. The claims relate to an extremely large number of possible compositions. In fact, the claims contain so many options that a lack of clarity and conciseness within the meaning of Article 6 PCT arises to such an extent as to render a meaningful search of the claims impossible. The same is true for claims 8, 13-14, 16, 18, 20, 22 and partly for claims 10-11 (the terms higher carbohydrate polymer and higher polysaccharide) where wide and vague specifications are used.

Consequently, the search has been carried out for those parts of the application which appear to be clear and concise, namely those parts relating to compositions comprising the compounds, or compounds from well-defined groups, mentioned in claims 4-25. A search has also been carried out for general terms, such as sugars, alcohols and proteins, and all compounds in table 1 in the description.

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Box III

2: Claims 13-14, 16-21 and partly claims 1-3, 15, 26-40 directed to compositions comprising alcohols.

3: Claims 22-25 and partly claims 1-2, 26-40 directed to compositions comprising proteins and amino acids.

A full search has been carried out, which relates to the inventions mentioned above.

The present application has been considered to contain 3 inventions which are not linked such that they form a single general inventive concept, as required by Rule 13 PCT for the following reasons:

The single general concept of the present application is the teaching that the compound capable of forming a reversible bond or association with gaseous nitric oxide (NO) is an organic compound comprising at least one hydroxyl group.

Reference is made to the following documents:

US2002061879A1 (D1), US6417162B1 (D2), US2003050305A1 (D3),
WO0057891A1 (D4), WO9638136A1 (D5), US6352709B1 (D6),
US2004162243A1 (D8), WO9635416A1 (D7), EP1023900A2 (D9),
WO9422482A1 (D10)

Document D1-D10 all show that it is known to associate protein and polypeptides with NO. Many of the documents (D1-D8) also show that it is known to associated sugars and NO. In all the documents it is stated that the active form of nitric oxide can be provided by gaseous NO. Further, in D5-D7 and D9-D10 it is explained that the nitrosation can be achieved by exposure to NO gas under anaerobic conditions. This means that compositions for delivery of gaseous NO comprising an organic compound comprising at least one hydroxyl group are known.

Thus, the single general concept is known/obvious and cannot be considered as a single general inventive concept in the sense of Rule 13.1 PCT.

No other features can be distinguished which can be considered as same or corresponding special technical features in the sense of Rule 13.2 PCT.

Thus, the application lacks unity of invention.

CORRECTED

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Box No. IV Text of the abstract (Continuation of item 5 of the first sheet)

The invention relates to compositions and methods for use in the delivery of gaseous nitric oxide (NO) to a mammal, preferably a human. The compositions for the delivery of the gaseous NO comprise a compound capable of forming a reversible bond or association to NO. Suitable compounds are among others alcohols, carbohydrates and proteins. The nitric oxide is delivered to a mammal for prophylactic and/or therapeutic purposes.

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A. CLASSIFICATION OF SUBJECT MATTER

IPC: see extra sheet
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: A61K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI DATA, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 20020061879 A1 (DAVID S. GARVEY ET AL), 23 May 2002 (23.05.2002), paragraphs (0002); (0008)-(0010); (0012); (0123); (0125)-(0130); (0137)-(0141); (0150)-(0151); (0153); claims 9-10, 12-16, 24-30 --	1-3, 10, 13-14, 16, 18, 22-32, 34-40
X	US 20040162243 A1 (PRZEMYSŁAW A. MAREK ET AL), 19 August 2004 (19.08.2004), paragraphs (0002); (0008); (0043)-(0045); (0133)-(0137); (0146)-(0150); (0160); (0162); (0164); (0167)-(0169); (0174); claims 5-6, 8-10, 14-16 --	1-3, 10, 22-40

☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents

- "A" document defining the general state of the art which is not considered to be of particular relevance
 "E" earlier application or patent but published on or after the international filing date
 "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
 "O" document referring to an oral disclosure, use, exhibition or other means
 "P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

26 January 2006

Date of mailing of the international search report

30-01-2006

Name and mailing address of the ISA/
Swedish Patent Office
Box 5055, S-102 42 STOCKHOLM
Facsimile No. +46 8 666 02 86

Authorized officer

Eva Johansson/EIs
Telephone No. +46 8 782 25 00

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 0057891 A1 (TRUSTEES OF BOSTON UNIVERSITY), 5 October 2000 (05.10.2000), page 1, line 8 - line 21; page 16, line 23 - page 18, line 3; page 19, line 11 - page 20, line 21, page 24, lines 4-14; page 25, line 11-page 26, line 29; claims 2-3,7-9,29-30,34-35,46-47,51-52, 65-67 --	1-3,10,22-40
X	US 20030050305 A1 (INIGO SAENZ DE TEJADA), 13 March 2003 (13.03.2003), paragraphs (0002); (0038)-(0041); (0132)-(0136); (0144)-(0147); (0161); (0163); (0165); (0167)-(0175), claims 16-17,19-21,49-50,53-54 --	1-3,10,22-40
X	US 6417162 B1 (DAVID S. GARVEY ET AL), 9 July 2002 (09.07.2002), paragraphs (0003); (0008); (0128); -(0131);(0139)-(0143);(0152)-(0155) claims 10-11, 13-17 --	1-3,10, 13-14,16,18, 22-32,34-40
X	WO 9638136 A1 (NITROMED, INC.), 5 December 1996 (05.12.1996), page 9, line 13 - page 11, line 24; page 22, line 10 - page 24, line 22; page 29, line 1 - page 31, line 7, page 36, lines 8-20; page 38, line 10-page 40, line 7; claims 1-50 --	1-3,10,22-40
X	US 6352709 B1 (JONATHAN S. STAMLER ET AL), 5 March 2002 (05.03.2002), column 5, line 10 - line 20; column 5, line 34 - column 6, line 2; column 10, line 58 - column 11, line 55, column 15, line 24 - column 17, line 8; column 18, lines 53-65; column 19, line 30 - column 20, line 24; column 21, lines 42-65 --	1-3,10,22-40
X	WO 9635416 A1 (NITROMED, INC.), 14 November 1996 (14.11.1996), page 9, line 33 - page 11, line 9; page 22, line 24 - page 24, line 22; page 29, line 1 - page 32, line 23, page 36, lines 8-21; page 39, line 27 - page 40, line 7; claims 1-50 --	1-3,10,22-40

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 1023900 A2 (BRIGHAM AND WOMEN'S HOSPITAL), 2 August 2000 (02.08.2000), paragraphs (0003)-(0005), (0017)-(0018), (0026); (0033)-(0034), (0039), (0054), (0081), (0091), (0109), (0118), (0150), (0153), (0182), claims 1-5 --	1-2, 22-25, 27-40
X	WO 9422482 A1 (BIORELEASE TECHNOLOGIES, INC.), 13 October 1994 (13.10.1994), page 2, paragraph 4 - page 3, paragraph 3; page 7, paragraph 2; page 9, paragraph 3; page 10, paragraphs 2-3; page 12, paragraph 4; page 16, paragraph 3-page 17, paragraph 3, claims 1-66 --	1-2, 22, 27-30, 35-40
A	WO 2004026345 A1 (NEW YORK UNIVERSITY), 1 April 2004 (01.04.2004), See paragraphs (0020)-(0025), (0031), (0033), (0036), (0042)-(0043), (0046), (0053)-(0059), (0070)-(0079), (0105)-(0108), (0115), (0118), (0129)-(0141), claims 1-27 --	1-2, 22-40
A	WO 9967296 A1 (DUKE UNIVERSITY MEDICAL CENTER), 29 December 1999 (29.12.1999) --	1-40
A	US 6673338 B1 (ERNST V. ARNOLD ET AL), 6 January 2004 (06.01.2004) --	1-40
A	US 20020094985 A (ROBERT A. HERRMANN ET AL), 18 July 2002 (18.07.2002) -- -----	1-40

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INTERNATIONAL PATENT CLASSIFICATION (IPC):

A61K 33/00 (2006.01)

A61K 47/10 (2006.01)

A61K 47/26 (2006.01)

A61K 47/36 (2006.01)

A61K 47/42 (2006.01)

A61P 11/00 (2006.01)

A61K 9/107 (2006.01)

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Information on patent family members

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